

**TWO NEW SPECIES OF THE GENUS *LIOPTERA* CHAUDOIR
(COLEOPTERA: CARABIDAE: LEBIINAE) FROM THE PAPUAN
AND SOUTHERN ORIENTAL REGIONS**

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Abstract

Two species of *Lioptera* Chaudoir are described: *L. storeyi* sp. n. from Papua New Guinea and the island of Halmahera, and *L. riedeli* sp. n. from Sulawesi. Both are closely related *inter se*, but they differ in shape of the clytral spots and density of punctation and microreticulation; and both are distinguished from the related *L. louwerensi* Andrewes from Sulawesi by the anterior clytral spot not reaching the base of the elytra. A new key to all species of *Lioptera* is provided.

Introduction

While studying samples collected during the light trapping projects carried out by Olivier Missa in 1994-1996 in Madang Province, and by Roger Kitching and co-workers in 2000 in Morobe Province, both in Papua New Guinea, I detected a few specimens of a species of the genus *Lioptera* Chaudoir which do not match any of the recorded species, although they are fairly similar to *L. louwerensi* Andrewes described from southern Sulawesi. A visit to the National Museum Naturalis, Leiden, revealed an additional specimen from Halmahera, which obviously belongs to the same species.

Specimens from Sulawesi, kindly given to me by A. Riedel, Karlsruhe, and loaned by C. Gillett of the Natural History Museum, London, revealed another new species, likewise closely related to *L. louwerensi*. Both new species are described herein and a key to all *Lioptera* species is provided, which should replace the old key of Heller (1903) and the partial key of Jedlicka (1963).

Materials and methods

The holotype of *Lioptera storeyi* is deposited in Institut Royal des Sciences Naturelles, Bruxelles (IRSNB); the holotype of *L. riedeli* is stored in the working collection of the author in Zoologische Staatssammlung, Munich (CBM); paratypes are shared with National Museum of Natural History (Naturalis), Leiden (RMNH), The Natural History Museum, London (BMNH), Queensland Museum, Brisbane (QMB), IRSNB and CBM.

Measurements were made under a stereo microscope using an ocular micrometer. Length is from apical margin of labrum to apex of elytra including the short spines, hence, length measurements may slightly differ from those of other authors. Length of pronotum was measured along midline, width of pronotum at widest part. Length of elytra was taken from the most advanced part of humerus to the very apex.

For dissection of the male genitalia, the specimen was soaked in a moist jar for a night, then the genitalia were cleared in hot 4% KOH. The photographs were taken at sequential focal depths on a Canon 40D camera, with a 60 mm macro lens on a Leica MZ6 stereomicroscope, processed into single sharp images with Helicon Focus software, before final editing with Photoshop.

Genus *Lioptera* Chaudoir

Lioptera Chaudoir, 1869: 208; Heller 1903: 241; Csiki 1932: 1376; Jedlicka 1963: 339; Lorenz 1998: 431. Type species: *Lioptera quadriguttata* Chaudoir, 1869, by monotypy.

Remarks. The lebiine genus *Lioptera* at present includes 10 species distributed between south-eastern mainland Asia including southern Japan and China, the Malay Peninsula, the Philippine Islands and the Greater Sunda Islands including Sulawesi, but not yet further south (Csiki 1932, Stork 1986, Lorenz 1998). Hence, the genus has not been recorded from New Guinea (Darlington 1968).

All species of this genus are rather large, markedly wide and depressed, with short and transverse, rather square pronotum, and with wide, quadrimaculate, weakly striate elytra, commonly denticulate at apex. Additional technical characters are: ground colour black, elytra with yellow or orange spots of various shape; whole surface impilose; eyes large, semicircular, remarkably protruded; antenna rather short, pilose from apical third of 4th antennomere; mentum edentate; glossa narrow, bisetose at apex, paraglossae wide, hyaline, far surpassing glossa; palpi not widened towards apex, sparsely pilose; pronotum very wide, square, with obtuse basal angles; elytra widened posteriad, sinuate at apex; striae barely impressed, consisting of rows of more or less fine punctures; hind wings fully developed; legs rather elongate, at least the basal tarsomere of all legs finely pilose on upper surface; 4th tarsomeres not dilated and excised; claws finely denticulate; aedeagus with sclerotized teeth in the inner sac of variable number and distribution; gonocoxite 2 elongate, with one dorso-median and two ventro-lateral ensiform setae.

The aedeagi of those species dissected are fairly similar to those of some *Coptodera* Chaudoir in that the internal sacs bear a variable number of spines or denticulate sclerotised plates. However, they differ from the aedeagi of *Coptodera* species known to me, in that the orifice is completely located on the lower surface.

The genus is probably closely related to the circumtropical genus *Coptodera* which includes a great number of species in the Indo-Australian Region. The extremely wide, depressed body and the reduced striation of the elytra are certainly apomorphic compared with the condition of these characters in *Coptodera*.

Lioptera storeyi sp. n.

(Figs 1-3)

Types. *Holotype* ♂, PAPUA NEW GUINEA: Canopy Mission, Madang Province, Baiteta Light AR60, 01.vi.1996, Leg. Olivier Missa (in IRSNB). *Paratypes*: PAPUA NEW GUINEA: 1 ♀, Canopy Mission, Madang Province, Baiteta Light AR10, 16.iv.1994, leg. Olivier Missa (CBM); 2 ♂♂, same data, AR66, AR42, 24.vi.1996 (CBM, IRSNB); 1 ♂, same data, M1, 18.v.1993 (IRSNB); 1 ♀, 06°40.30'S, 146°48.00'E, Oomsis, Morobe, Light Trap Canopy 2, 28.vi.2000, R.L. Kitching (in QMB). INDONESIA (Makulu Utara): 1 ♀, NW Halmahera, 23 km SW of Tobelo, Tunuo camp, 19-2.ix.1995, leg. J. van Tol, B. Ansari & R. de Jong, at light, along rather fast flowing stream through disturbed forest, 1°32'40"N 127°53'50"E, (GPS), alt. 150-200 m (in RMNH).

Diagnosis. A species of genus *Lioptera* Chaudoir, characterized by moderate size, large, barely serrate, slightly transverse elytral spots, very sparse and weak punctuation of elytral striae and intervals, shortly bispinose apex of elytra, and presence of a large number of spines and denticulate plates in the internal sac of the aedeagus. It is distinguished from both most similar species, *L. louwerensi* Andrewes and *L. riedeli* sp. nov. from Sulawesi, by less rugose surfaces of head and pronotum, and finer and much sparser punctuation of the elytral intervals which thus appear more glossy. From *L. louwerensi* it is further distinguished by less serrate elytral spots, the anterior elytral spot not touching the base, the posterior spot being much more transverse; and from *L. riedeli* by less serrate elytral spots that medially touch the 1st stria.

Description. Measurements. Length: 9.7-10.6 mm; width: 4.25-4.85 mm. Ratios. Width/length of pronotum: 1.91-1.97; width of pronotum/width of head: 1.21-1.25; length/width of elytra: 1.40-1.46.

Colour (Fig. 3). Upper surface black, elytra with four large yellow spots. The humeral spot sub-triangular and very slightly serrate, between 1st and 8th striae, not touching suture, lateral margin or base. The apical spot transverse, also between 1st and 8th striae, slightly serrate. Lower surface black, in parts dark piceous. Antennae and legs black, tarsi and sometimes also tibiae slightly paler, dark or reddish piceous. Palpi dark piceous with paler tips.

Head. Large and wide, though narrower than pronotum. Eyes very large, laterally much protruded, semicircular, orbits barely recognizable. Frons with two wide, slightly sinuate sulci that posteriad reach to middle of the eyes. Clypeus without median sulcus. Labrum square, apical margin slightly convex. Antenna short, surpassing base of pronotum by just a single antennomere. Median antennomeres only slightly longer than wide. Clypeus and frons with some irregular wrinkles, frons and vertex sparsely punctate. Microreticulation quite superficial, more distinct on vertex and neck, consisting of isodiametric meshes, surface moderately glossy.

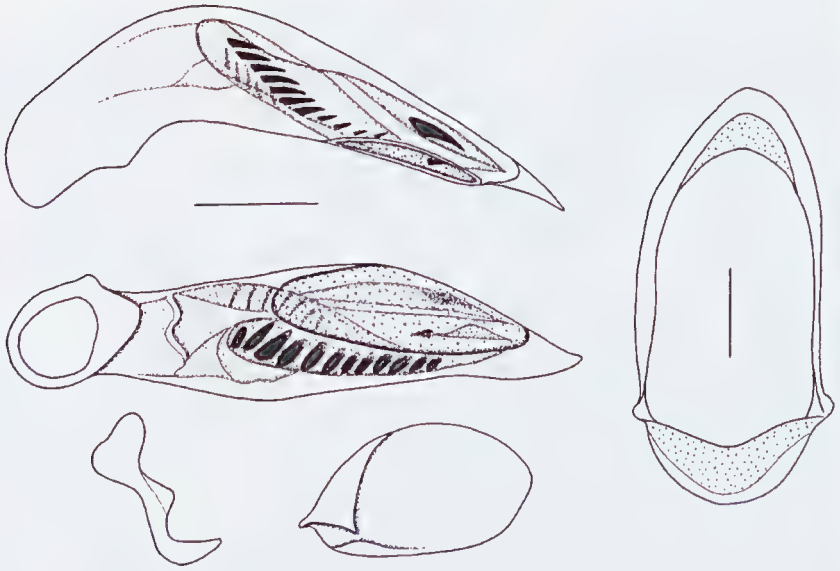


Fig. 1. *Lioptera storeyi* sp. n. Aedeagus, left side and lower surface; parameres; genital ring. Scale: 0.5 mm.

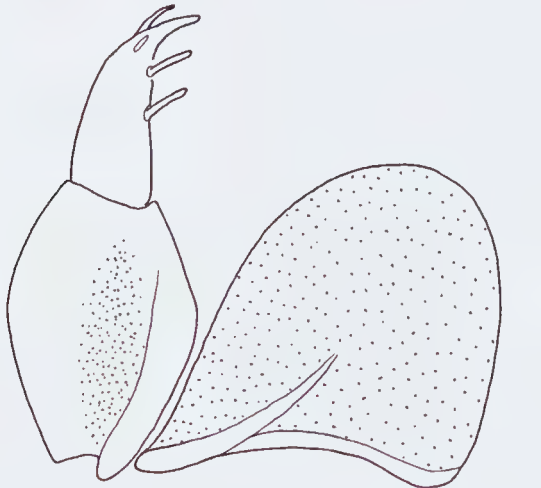
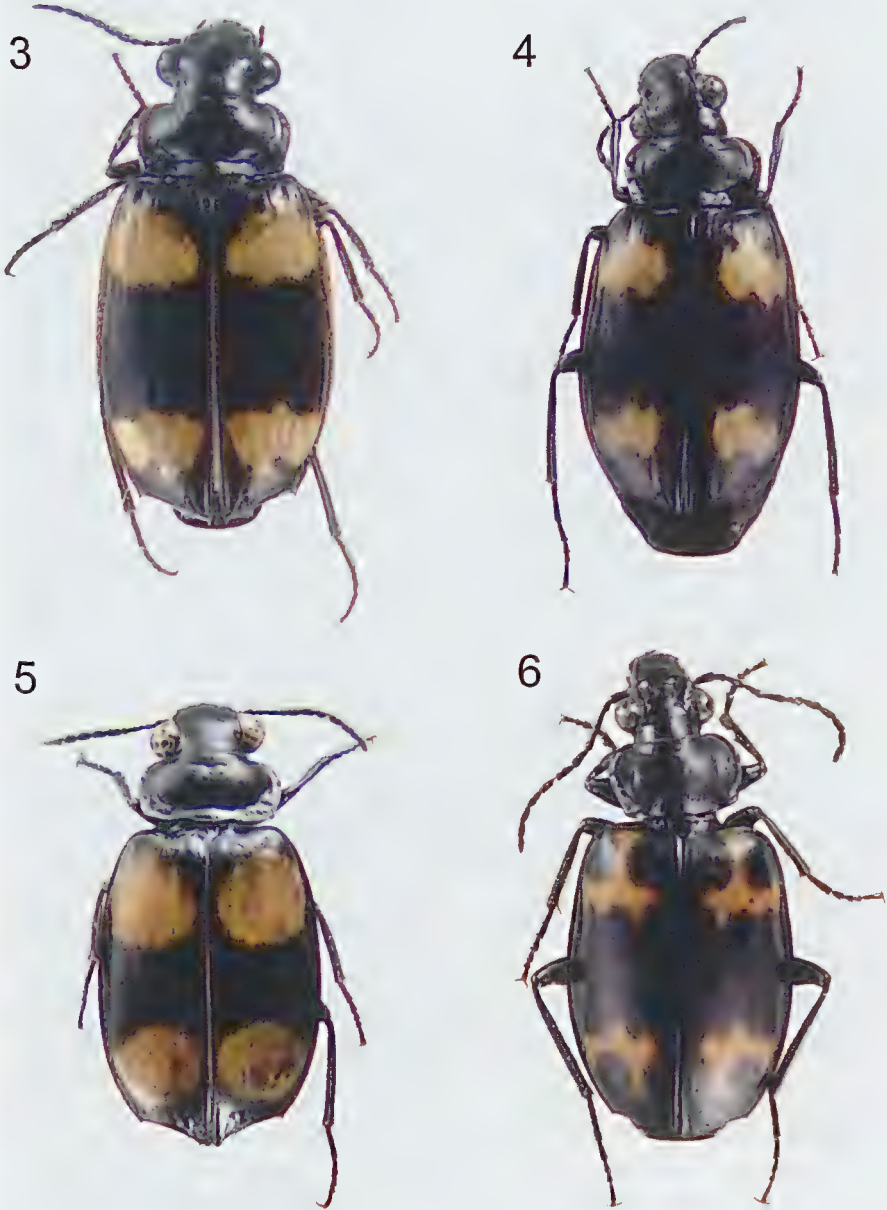


Fig. 2. *Lioptera storeyi* sp. n. Female gonocoxites 1 and 2, and lateral plate. Scale: 0.25 mm.



Figs 3-6. Habitus of *Lioptera* spp. (3) *L. storeyi* sp. n.; (4) *L. riedeli* sp. n.; (5) *L. malayana* Heller; (6) *L. plato* Bates. Body lengths: 10.4 mm; 10.0 mm; 9.0 mm; 15.2 mm.

Pronotum. Very wide, square, almost twice as wide as long, base slightly wider than apex. Apex gently concave, apical angles very widely rounded, lateral margins about straight and slightly oblique, widest diameter at about apical third. Basal angles distinct, very slightly obtuse, about 100°, base slightly bisinuate and in middle slightly convex. Apical margin and basal margin in median part with narrow border, briefly interrupted in the very middle. Lateral margin widely explanate, margin remarkably widened basad. Anterior marginal seta located at widest diameter at apical third, posterior marginal seta inserted at basal angle. Anterior transverse sulcus narrow but well impressed, posterior transverse sulcus deep and wide, running into the wide lateral basal grooves. Median line shallow, reaching base, but indistinct in front of anterior transverse sulcus. Disk with some elongate, irregularly transverse striae and some inconspicuous punctures. Microreticulation rather superficial, consisting of irregular, more or less transverse meshes, surface moderately glossy.

Elytra. Wide and depressed, markedly widened towards apex, widest at posterior third. Humerus widely rounded, lateral margin slightly convex throughout, apex oblique and slightly excised. Lateral apical and sutural angles shortly spinose. Scutellary striae elongate, 1st and 2nd striae united at scutellary pore. All striae present but not impressed, just marked by rows of fine punctures, therefore intervals absolutely depressed. Intervals with fine uni- to biseriate punctures and with extremely fine and superficial microreticulation which consists of very fine and slightly transverse meshes; hence surface glossy. 3rd interval quadripunctate, the anterior two setiferous punctures located near the 3rd stria, the first puncture situated near base, the second one shortly behind the posterior margin of the anterior spot; both posterior punctures located near the 2nd stria, the third one within the posterior spot, the fourth one very close to the apex; seta elongate and erect. Lateral margin with 22-24 very elongate marginal setae, series barely interrupted in middle.

Lower surface. Metepisternum about twice as long as wide at apex. Terminal sternum quadrisetose in both sexes.

Legs. Elongate, meso- and metatibiae remarkably canaliculate on lateral, median, and dorsal surfaces. Dorsal surface of tarsi, except 5th tarsomeres, sparsely setose, best seen on the basal tarsomeres. Tarsal claws moderately large, quadridentate. Three basal tarsomeres of protarsus and two basal tarsomeres of mesotarsus in male biserially squamose.

Male genitalia (Fig. 1). Genital ring rather narrow, parallel, moderately asymmetric at apex. Aedeagus fairly elongate, somewhat depressed, laterally bisinuate. Lower surface basally almost straight, near apex slightly sinuate. Apex fairly elongate, depressed, triangular, tip acute. Orifice situated completely on the lower surface, but slightly moved to the right side. Internal

sac in middle with two rows of about 12 and 8 strong, sclerotized teeth respectively; a single large tooth on the right side at the roof near apex of orifice, and a small tooth in middle of bottom of internal sac. Left paramere large, oval, right paramere small.

Female genitalia (Fig. 2). Of coptoderine shape and structure. Gonocoxite 1 without any setae at apical rim. Gonocoxite 2 with one elongate dorso-apical and two elongate ventro-lateral ensiform setae, apparently without dorsal nematiform setae, but with the elongate groove from where the nematiform setae normally arise. Lateral plate large and convex, without any marginal setae.

Variation. Very little variation noted.

Etymology. The name is in honour of the late Ross Storey who, in spite of his severe disablement, was extremely active and successfully stimulated entomology of the Australian Region for many years.

Distribution. So far recorded from Papua New Guinea and the island of Halmahera in the Moluccas.

Comments. All specimens were collected at light in rain forest, the paratype from Oomsis sampled high up in the canopy. This is probably an arboreal species. According to size, body shape, shape and structure of the elytral spots, and structure of the elytral apex, *L. storeyi* is probably most closely related to *L. louwerensi* Andrewes and *L. riedeli* sp. n. from Sulawesi.

***Lioptera riedeli* sp. n.**

(Fig. 4)

Types. *Holotype* ♀, INDONESIA: Sulawesi, L. Poso, Tetena, Tonusu, 800 m, 6-8.x.1997, A. Riedel (CBM). *Paratypes:* INDONESIA (Sulawesi Tengah): 2 ♀♀, Vert. Series, 20 m, actinic, code, 28.ii.80, Nr. Morowali, Ranu River Area, 27.i.-20.iv.1980, S.L. Sutton, C.J. Rees, B.M.-1980-281 (BMNH).

Diagnosis. A species of genus *Lioptera* Chaudoir, characterized by moderate size, moderately large, serrate, transverse elytral spots, rather dense and distinct punctation of elytral striae and intervals, and shortly bispinose apex of elytra. It is distinguished from its two most similar species *L. louwerensi* Andrewes from Sulawesi and *L. storeyi* sp. nov. from New Guinea and Halmahera by both elytral spots touching the 2nd stria. It is further distinguished from *L. louwerensi* by much smaller elytral spots, the anterior spot not touching the base, the posterior spot being much more transverse; and from *L. storeyi* by more serrate elytral spots, far denser punctation of the elytral intervals and rugose surfaces of head and pronotum.

Description. Measurements. Length: 9.7-10.8 mm; width: 4.3-5.0 mm. Ratios. Width/length of pronotum: 1.87-1.97; width of pronotum/width of head: 1.25-1.27; length/width of elytra: 1.39-1.45.

Colour (Fig. 4). Upper surface black, elytra with four moderately large yellow spots. The humeral spot rather transverse and moderately serrate, between 2nd and 8th striae, not touching base and lateral margin. The apical spot very transverse, also between 2nd and 8th striae, slightly serrate. Lower surface black, abdomen more or less dark piceous. Antennae and legs black, sometimes tarsi and also tibiae slightly paler, dark or reddish piceous. Palpi black or dark piceous with paler tips.

Head. Large and wide, but narrower than pronotum. Eyes very large, protruding far laterally, semicircular, orbits barely recognizable. Frons with two wide, slightly sinuate sulci that reach posteriorly to middle of the eyes. Clypeus without median sulcus. Labrum square, apical margin slightly convex. Antenna short, surpassing base of pronotum by a single antennomere. Median antennomeres slightly longer than wide. Clypeus and frons with many irregular wrinkles, frons and vertex sparsely punctate. Microreticulation distinct, consisting of almost isodiametric meshes, surface rather dull.

Pronotum. Very wide, square, almost twice as wide as long, base slightly wider than apex. Apex gently concave, apical angles very widely rounded, lateral margins about straight and slightly oblique, widest diameter at about apical third. Basal angles distinct, very slightly obtuse, about 100° , base slightly bisinuate and slightly convex in middle. Apical margin and basal margin in median part with narrow border, in the very middle shortly interrupted. Lateral margin widely explanate, margin remarkably widened basad. Anterior marginal seta located at widest diameter at apical third, posterior marginal seta inserted at basal angle. Anterior transverse sulcus narrow but well impressed, posterior transverse sulcus deep and wide, running into the wide lateral basal grooves. Median line shallow, reaching base, but indistinct in front of anterior transverse sulcus. Disk with dense, elongate, irregularly transverse striae and some inconspicuous punctures. Microreticulation fairly distinct, consisting of irregular, more or less transverse meshes, surface rather dull.

Elytra. Wide and depressed, markedly widened towards apex, widest in posterior third. Humerus widely rounded, lateral margin slightly convex throughout, apex oblique and slightly excised. Lateral apical and sutural angles shortly spinose. Scutellary striole elongate, 1st and 2nd striae united at scutellary pore. All striae present but not impressed, just marked by rows of fine punctures, therefore intervals absolutely depressed. Intervals with rather coarse, dense, irregularly 4-5-seriate punctures and with extremely fine but distinct microreticulation which consists of very fine and slightly transverse meshes; surface but moderately glossy. 3rd interval quadripunctate, the anterior two setiferous punctures located near the 3rd stria, the first puncture situated near base, the second one at or shortly behind the posterior margin of the anterior spot; both posterior punctures located near the 2nd stria, the third

in the middle of the median margin of the posterior spot, the fourth one very close to the apex; seta elongate and erect. Lateral margin with 20-22 very elongate marginal setae, series barely interrupted in middle.

Lower surface. Metepisternum about twice as long as wide at apex. Terminal sternum quadrisetose in female. Legs. Elongate, meso- and metatibiae remarkably canaliculate on lateral, median, and dorsal surfaces. Dorsal surface of tarsi, except 5th tarsomeres, sparsely setose, best seen at the basal tarsomeres. Tarsal claws moderately large, quadridentate. Male protarsus unknown.

Male genitalia. Unknown.

Female genitalia. Similar to those of *L. storeyi* sp. n.

Variation. Very little variation noted.

Etymology. The name is in honour of Dr Alexander Riedel, well known collector of many interesting new species in the southern Oriental-Papuan area.

Distribution. So far recorded from central Sulawesi.

Comments. Habitat largely unknown; the holotype was probably sifted from the bark of logs in rain forest. This is probably an arboreal species. According to size, body shape, shape and structure of the elytral spots, and structure of the elytral apex, *L. riedeli* is probably most closely related to *L. louwerensi* Andrewes from Sulawesi and *L. storeyi* sp. n. from New Guinea and Halmahera.

Key to species of *Lioptera* Chaudoir

- 1 Anterior elytral spot not touching the basis and without a distinct stripe running basad on 5th or 5th and 6th intervals (Figs 3-5) 2
- Anterior elytral spot clearly touching the basis, with a distinct stripe running basad on 5th or 5th and 6th intervals (Fig. 6) 6
- 2 The anterior spot medially reaching the 2nd stria (Fig.4) 3
- The anterior spot medially reaching the 1st stria (Fig. 3) 5
- 3 Larger species, length >12 mm; clypeus with a narrow longitudinal sulcus in middle. Bhutan, Sikkim, northern Borneo
..... *oberthueri* Heller, 1903
- Smaller species, length 11 mm; clypeus without longitudinal sulcus. Philippine Islands, Sulawesi 4
- 4 Anterior elytral spot sub-triangular; intervals with a fine, roughly uniseriate row of punctures. Philippine Islands
..... *quadriguttata* Chaudoir, 1869

- Anterior elytral spot transverse and somewhat serrate (Fig. 4); intervals with rather dense punctation. Sulawesi *riedeli* sp. n.
- 5 Both elytral spots large and almost circular (Fig. 5); punctation of intervals denser and coarser; microreticulation consisting of just slightly transverse meshes. Malaysia, Borneo *malayana* Heller, 1903
- Anterior elytral spot sub-triangular, posterior spot transverse and slightly serrate (Fig. 3); punctation of elytral intervals sparser and finer; microreticulation consisting of very transverse meshes. Papua New Guinea, Halmahera *storeyi* sp. n.
- 6 Elytra shortly spinose at suture and at lateral apical angle 7
- Elytra either spinose only at suture, or not spinose at all 11
- 7 Large species, body length >14 mm; pronotum c. 1.75 x as wide as long 8
- Smaller species, body length <11.5 mm; pronotum c. 2 x as wide as long, or wider 9
- 8 Lateral apical angle sharply dentate, sutural angle with sharp tooth (Fig. 6). Borneo *plato* Bates, 1883
- Lateral apical angle barely dentate, sutural angle with very blunt tooth. Sumatra *bloetei* Louwerens, 1953
- 9 Intervals with a single, irregular row of punctures. Laos *pseuda* Heller, 1903
- Intervals with dense punctation. Malaysia, Borneo, Sulawesi 10
- 10 Elytral spots smaller and very serrate; punctation of striae and intervals denser, intervals with 4-6 irregular rows of punctures; pronotum less wide, ratio w/l < 2. Malaysia, Borneo *brevicornis* Heller, 1903
- Elytral spots less serrate; punctation of striae and intervals less dense, intervals with 3-4 irregular rows of punctures; pronotum wider, ratio w/l > 2. Sulawesi *louwerensi* Andrewes, 1941
- 11 Elytra shortly spinose at suture, lateral apical margin obtusely angulate; intervals with a single irregular row of punctures; head and pronotum barely punctate, rather glossy. Sulawesi *tetraspila* Heller, 1903
- Elytra not spinose at suture, lateral apical margin rounded; intervals densely punctate; head and pronotum very rugose. Japan, China, Vietnam *erotyloides* Bates, 1883

Although I was not able to compare the holotypes of *L. bloetei* Louwerens and *L. plato* Bates, from description and figure *L. bloetei* looks extremely similar to *L. plato*. Unfortunately, the description of the lateral apical angles

of the elytra and the figure (Louwerens 1953: fig. 1d) do not match. Because occurrence of the same species on Sumatra and Borneo is quite common, future comparison of the types of both species may demonstrate their species identity.

Discussion

Lioptera storeyi sp. n. is the first species of *Lioptera* recorded from New Guinea, thus extending the range of this Indo-Malayan genus further into the Australian Region. Apparently, however, the genus does not occur in Australia itself. This new species is very similar, and probably closely related, to *L. louwerensi*, which occurs in Sulawesi.

L. riedeli sp. n. likewise is closely related to *L. louwerensi*, but also to *L. storeyi*. Hence the three species form a group of very closely related species in the southeastern part of the range of the genus. Unfortunately, the male genitalia of *L. louwerensi* and *L. riedeli* are so far unknown to me. Further consideration of relationships should thus be postponed until males of all three species are available.

Certainly it is surprising that two very similar species of a subgroup occur on Sulawesi. However, the type series of *L. louwerensi* is from the island of Salayer off the south coast of the southwestern arm of Sulawesi, whereas the type series of *L. riedeli* is from northern central Sulawesi. Because it is well known that the island of Sulawesi was combined from different terranes, this distribution may match different centres of speciation or different immigration routes of species.

Because all specimens of *L. storeyi*, and probably also two of *L. riedeli* have been captured at light, little can be said about their biology. However, both new species are probably arboricolous rain forest dwelling species like their congeners, which are said to be tree living as well. This is corroborated by the label notes of one specimen of the new species from New Guinea and of specimens of two additional *Lioptera* species from Brunei, Borneo, all collected at light high up in the canopy of rain forest. Thus, the *Lioptera* species may belong to the canopy fauna rather than to that of tree trunks and logs close to the floor of rain forest, and this may also explain their rarity in most collections.

Acknowledgements

I am very grateful to André Drumont (Bruxelles), Conrad Gillett (London), Jan Krikken and Fred van Assen (Leiden), Geoff Monteith and Roger Kitching (Brisbane), and Alexander Riedel (Karlsruhe) for kindly lending the types and the material of the new species, or making it available to me. I am also indebted to Geoff Thompson (Queensland Museum, Brisbane) for taking the habitus photos.

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